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| 09/880,167 | 06/12/2001 | Yong Rao | 5150-54700 | 6780 |

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| EXAMINER | |
| BARAN, MARY C | |
| ART UNIT | PAPER NUMBER |
| 2857 | |

DATE MAILED: 08/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/880,167

Applicant(s)

RAO ET AL.

Examiner

Mary Kate B Baran

Art Unit

2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 23-34 and 40 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8, 12-20, 22, 35, 36 and 41-43 is/are rejected.
- 7) ☒ Claim(s) 5, 9-11, 21, 37-39 and 44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it exceeds 150 words.

Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 6, 8, 14-16, 19, 20, 35, 36, 41 and 42 are rejected under 35 U.S.C. 102(e) as being anticipated by Marchok et al. (U.S. Patent No. 6,122,246) (hereinafter Marchok).

Referring to claims 1 and 35, Marchok a method for determining one or more signal parameters for a tone in an input signal (see Marchok, column 4 lines 2-5), the method comprising: receiving samples of the input signal (see Marchok, column 4 lines 17-21), wherein the input signal includes the tone (see Marchok, column 5 lines 28-31); generating a frequency transform of the samples (see Marchok, column 4 lines 47-50); identifying a frequency location proximate to an amplitude peak in the frequency transform (see Marchok, column 14 lines 13-22), wherein the amplitude peak

Art Unit: 2857

corresponds to the tone (see Marchok, column 3 lines 46-49); selecting two or more frequency bins proximate to the frequency location in the frequency transform (see Marchok, column 14 lines 9-13); and determining a tone frequency value that minimizes a difference between at least a first expression and a second expression (see Marchok, column 6 lines 6-23); wherein the first expression comprises a sum of two or more numerator terms (see Marchok, column 9 lines 25-4) divided by a sum of two or more denominator terms (see Marchok, column 10 lines 5-7), wherein the first expression includes a tone frequency variable; wherein each numerator term and each denominator term corresponds to one of the frequency bins (see Marchok, column 9 lines 25-40); and wherein the second expression comprises a sum of one or more of the numerator terms (see Marchok, column 9 lines 25-40) divided by a sum of one or more of the denominator terms (see Marchok, column 10 lines 5-7 and lines 39-41), wherein the second expression includes the tone frequency variable (see Marchok, column 3 line 53 and column 9 lines 7-13); wherein the tone frequency value comprises a frequency of the tone (see Marchok, column 9 lines 7-13 and column 5 lines 28-33).

Referring to claims 2 and 36, Marchok teaches that the tone frequency variable represents a correct tone frequency value of the tone; and wherein the determined tone frequency value represents an approximation of the correct tone frequency value (see Marchok, column 9 lines 7-13).

Art Unit: 2857

Referring to claim 3, Marchok teaches that the first expression is approximately equivalent to the second expression when the correct tone frequency value is used for the tone frequency variable in the first and second expressions (see Marchok, column 3 line 62 – column 4 line 2).

Referring to claim 6, Marchok discloses that determining a tone frequency value comprises: computing a plurality of differences between the first expression and the second expression for different respective tone frequency values of the tone frequency variable; and selecting the tone frequency value that produces a smallest difference (see Marchok, column 5 line 58 – column 6 line 23).

Referring to claim 8, Marchok teaches that the first expression and the second expression are each a complex expression (see Marchok, column 9 lines 14-24).

Referring to claim 14, Marchok teaches computing one or more of the amplitude and phase of the tone using the determined tone frequency value (see Marchok, column 4 lines 47-50).

Referring to claim 15, Marchok teaches that at least one of the two or more frequency bins is on each side of the frequency location (see Marchok, column 9 lines 7-13).

Referring to claim 16, Marchok teaches identifying a frequency location of at least one first magnitude peak in the frequency transform; and wherein said selecting comprises selecting two or more frequency bins proximate to the at least one first magnitude peak in the frequency transform (see Marchok, column 9 lines 7-13).

Referring to claims 19 and 41, Marchok teaches a tone detection system, comprising: an input for receiving samples of an input signal (see Marchok, column 4 lines 17-21), wherein the input signal includes a tone; a processor (see Marchok, column 4 lines 17-21); and a memory medium coupled to the processor; wherein the memory medium stores a tone detection software program for detecting the tone present in the input signal (see Marchok, column 8 lines 12-15); wherein the processor is operable to execute the tone detection software program to implement generating a frequency transform of the input signal (see Marchok, column 4 lines 47-50); identifying an amplitude peak in the frequency transform (see Marchok, column 14 lines 13-22), wherein the amplitude peak corresponds to the tone (see Marchok, column 3 lines 46-49); selecting two or more frequency bins in a neighborhood of the amplitude peak in the frequency transform (see Marchok, column 14 lines 9-13); and determining a tone frequency value that minimizes a difference between at least a first expression and a second expression (see Marchok, column 6 lines 6-23); wherein the first expression comprises a sum of two or more numerator terms (see Marchok, column 9 lines 25-40) divided by a sum of two or more denominator terms (see Marchok, column 10 lines 5-7 and lines 39-41), wherein the first expression includes a tone frequency variable (see

Art Unit: 2857

Marchok, column 3 line 53 and column 9 lines 7-13); wherein each numerator term and its corresponding denominator term corresponds to one of the frequency bins (see Marchok, column 9 lines 25-40); and wherein the second expression comprises a sum of one or more of the numerator terms (see Marchok, column 9 lines 25-40) divided by a sum of one or more of the denominator terms (see Marchok, column 10 lines 5-7 and lines 39-41), wherein the second expression includes the tone frequency variable (see Marchok, column 3 line 53 and column 9 lines 7-13); wherein the first expression is approximately equivalent to the second expression when the correct tone frequency value is used for the tone frequency variable in the first and second expressions (see Marchok, column 3 line 62 – column 4 line 2); wherein the tone frequency value comprises a frequency of the tone (see Marchok, column 9 lines 7-13 and column 5 lines 28-33).

Referring to claim 20, Marchok teaches that the first expression is approximately equivalent to the second expression when the correct tone frequency value is used for the tone frequency variable in the first and second expressions (see Marchok, column 3 line 62 – column 4 line 2).

Referring to claim 42, Marchok teaches that the tone frequency variable represents a correct tone frequency value of the tone; and wherein the determined tone frequency value represents an approximation of the correct tone frequency value (see Marchok, column 9 lines 7-13).

Claim R ejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 12, 13, 22 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchok (U.S. Patent No. 6,122,246) (hereinafter Marchok) in view of Cox (U.S. Patent No. 3,571,522).

Referring to claims 4 and 43, Marchok teaches all the features of the claimed invention except that a ratio of each numerator and its corresponding denominator term represent an amplitude of the tone.

Cox teaches that a ratio of each numerator and its corresponding denominator term represent an amplitude of the tone (see Cox, column 4 lines 65-66).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Marchok to include the teachings of Cox because a ratio representing the amplitude of a tone would have allowed the skilled artisan to account for the asymmetry of the signal (see Cox, column 4 lines 65-69).

Referring to claims 12 and 22, Marchok teaches all the features of the claimed invention except for storing the determined tone frequency value in a memory.

Cox teaches storing the determined tone frequency value in a memory (see Cox, column 4 lines 72-75).

Art Unit: 2857

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Marchok to include the teachings of Cox because storing the amplitude data would have allowed the skilled artisan to keep the data for further comparison and analysis.

Referring to claim 13, Marchok teaches all the features of the claimed invention except for outputting the determined tone frequency value.

Cox teaches outputting the determined tone frequency value (see Cox, column 4 line 75 – column 5 line 3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Marchok to include the teachings of Cox because outputting the data would have allowed the skilled artisan to further use and analyze the data.

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marchok et al. (U.S. Patent No. 6,122,246) (hereinafter Marchok) in view of Roth (U.S. Patent No. 5,617,491).

Referring to claim 7, Marchok teaches all the features of the claimed invention except for performing a Newton-Rhapson root finding method.

Roth teaches that said computing a plurality of differences comprises performing a Newton-Rhapson root finding method (see Roth, column 8 lines 4-16).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Marchok to include the teachings of Roth because using the

Newton-Rhapson method would have allowed the skilled artisan to produce a better estimate (see Roth, column 8 lines 4-6).

5. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchok et al. (U.S. Patent No. 6,122,246) (hereinafter Marchok) in view of Barazesh et al. (U.S. Patent No. 6,128,370) (hereinafter Barazesh).

Referring to claim 17, Marchok teaches all the features of the claimed invention except that the input signal comprises a plurality of tones; and wherein the method operates to find signal parameters of a first tone of the plurality of tones.

Barazesh teaches that the input signal comprises a plurality of tones; and wherein the method operates to find signal parameters of a first tone of the plurality of tones (see Barazesh, column 4 lines 57-64).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Marchok to include the teachings of Barazesh because detecting multiple tones would have allowed the skilled artisan to make tone detection decisions based on frequency ratios (see Barazesh, column 2 lines 3-6).

Referring to claim 18, Marchok teaches all the features of the claimed invention except for determining at least one signal parameter for each of the plurality of tones in the input signal.

Barazesh teaches determining at least one signal parameter for each of the plurality of tones in the input signal (see Barazesh, column 4 line 65 – column 5 line 10).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Marchok to include the teachings of Barazesh because detecting multiple tones would have allowed the skilled artisan to make tone detection decisions based on frequency ratios (see Barazesh, column 2 lines 3-6).

Allowable Subject Matter

6. Claims 5, 9-11, 21, 37-39 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 23-34 and 40 are allowed.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- (a) Tulai teaches a digital call progress tone detection method with programmable digital call progress tone detector.
- (b) Nelson teaches a method of estimating signal frequency.
- (c) Scheppach teaches a method for estimating the frequency of a time signal.
- (d) McPherson et al. teach supervisory audio tone detection in a radio channel.
- (e) Verreault et al. teach method and device for recognizing tones and sequences thereof.

Art Unit: 2857


- (f) Tsai et al. teach a CPE alert signal tone detector.
- (g) Nelson et al. teach a testing of digital subscriber loops using multi-tone power ration (MTPR) waveform.
- (h) Cannon et al. teach a robust signaling tone frequency measurement.
- (i) Ahmadi teaches tone detection using pitch period.
- (j) Schmitt teaches digital single-frequency tone detection in presence of aliases.
- (k) Denenberg teaches a tone detector using spectrum parameter estimation.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Kate B Baran whose telephone number is (703) 305-4474. The examiner can normally be reached on Monday - Friday from 8:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S Hoff can be reached on (703) 308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

MKB
July 30, 2003


MARC S. HOFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800